CLAIMS

1. Image recognition system comprising regularly disposed optical channels having a microlens and at least one detector which is situated in the focal plane thereof and extracts at least one image spot from the microimage behind the microlens, the optical axes of the individual optical channels having different inclinations in such a manner that they represent a function of the distance of the optical channel from the centre of the side of the image recognition system which is orientated towards the image, by means of which the ratio of the size of the field of view to the image field size can be determined specifically, and detectors are used with such high sensitivity that these have a large pitch with a small active surface area.

2. Image recognition system according to claim 1,

   characterised in that each optical channel detects at least one specific solid angle segment of the object space as corresponding image spot so that the totality of the transmitted image spots on the detector array allows reconstruction of the object.

3. Image recognition system according to claim 1,

   characterised in that the central spacing, i.e. pitch, of the microlenses differs slightly from the pitch of the detectors in order to ensure a different inclination of the optical axes for the individual channels.

4. Image recognition system according to one of the preceding claims,

   characterised in that the individual microlenses differ with respect to decentralisation relative to the detector, the focal distance, the conical

and/or aspherical parameters and hence enable different inclinations of the optical axes.

5. Image recognition system according to one of the preceding claims,

characterised in that microprisms which enable different inclinations of the optical axes are integrated in the individual microlenses.

6. Image recognition system according to one of the preceding claims,

characterised in that the individual microlenses are disposed on a base which has a convex or concave configuration and hence enable different inclinations of the optical axes.

7. Image recognition system according to one of the preceding claims,

characterised in that the detectors are disposed on a base which has a convex or concave configuration.

8. Image recognition system according to one of the preceding claims,

characterised in that the optical channels are free of off-axis aberrations for the different inclinations of the optical axes.

9. Image recognition system according to one of the preceding claims,

characterised in that the individual optical channels have different pitch differences between microlens and detector and/or pinhole for correction of distortion.

10. Image recognition system according to one of the preceding claims,

characterised in that the image recognition system has a constructional length of less than 1 mm.

11. Image recognition system according to one of the preceding claims,

characterised in that the number of optical channels is in the range of 10 x 10 to 1000 x 1000.

12. Image recognition system according to one of the preceding claims,

characterised in that the size of the optical channels is in the range of 10 µm x 10 µm to 1 mm x 1 mm.

13. Image recognition system according to one of the preceding claims,

characterised in that the regular arrangement of the optical channels are packed tightly in a square or a hexagon or are rotational-symmetrical.

14. Image recognition system according to one of the preceding claims,

characterised in that the positions of the microlenses and of the detectors are precisely defined lithographically.

15. Image recognition system according to one of the preceding claims,

characterised in that the optical channels are optically isolated from each other.

16. Image recognition system according to the preceding claim,

characterised in that the optical isolation is effected by lithographically produced separating walls.

17. Image recognition system according to one of the preceding claims,

characterised in that the detectors are present as a CCD, a CMOS photosensor array and/or a photosensor array comprising a polymer.

18. Image recognition system according to one of the preceding claims,

characterised in that at least a part of the microlenses is anamorphic.

19. Image recognition system according to one of the preceding claims,

characterised in that the optical channels respectively have a plurality of detectors of different function.

20. Image recognition system according to one of the preceding claims,

characterised in that pinhole diaphragms are disposed behind the microlenses and directly in front of the detectors and are positioned such that at least one pinhole diaphragm is assigned to each microlens.

21. Image recognition system according to the preceding claim,

characterised in that the ratio of the active surface of the detector to the active surface area of the microlens is adjustable in order to fix light strength and resolution power through the pinhole diaphragm.

22. Image recognition system according to the preceding claim,

characterised in that the pinhole diaphragms have a diameter in the range of 1 to 10 µm.

23. Image recognition system according to one of the two preceding claims,

characterised in that the pinhole diaphragm is produced from a metal or polymer coating or combinations thereof.

24. Image recognition system according to one of the preceding claims,

characterised in that the image recognition system has in addition a liquid lens which is pre-connected between image and microlenses in order to adjust the field of view.

25. Image recognition system according to one of the preceding claims,

characterised in that light sources are disposed on or between the optical channels.

26. Image recognition system according to one of the preceding claims,

characterised in that a pixel is assigned to each optical channel.

27. Image recognition system according to one of the preceding claims,

characterised in that a plurality of pixels is assigned to each optical channel.

28. Image recognition system according to the preceding claim,

characterised in that a plurality of pixels with different properties or groups of pixels of the same properties are present.

29. Image recognition system according to one of the two preceding claims,

characterised in that colour filters are disposed in front of a plurality of similar pixels.

30. Image recognition system according to one of the claims 27 to 29,

characterised in that a plurality of similar pixels at a greater spacing is disposed in an optical channel in order to increase the light strength without loss of resolution.

31. Image recognition system according to one of the claims 27 to 30,

characterised in that the plurality of pixels per optical channel is disposed such that the optical axes of at least two optical channels intersect in one object spot in order to enable a stereoscopic 3D photograph and/or a distance measurement.

32. Image recognition system according to one of the claims 27 to 31,

characterised in that dispersive elements for colour photos are disposed in front of or on the microlenses.

33. Image recognition system according to one of the claims 27 to 32,

characterised in that differently orientated gratings or structured polarisation filters are disposed in front of similar pixels of an optical channel in order to adjust the polarisation sensitivity.

34. Image recognition system according to one of the preceding claims,

characterised in that the image recognition system is combined with at least one liquid crystal element.

35. Use of the image recognition system according to one of the claims 1 to 34 as integral component in flatly-constructed small appliances, such as e.g. clocks, notebooks, PDAs or organisers, mobile telephones, spectacles or clothing items.

36. Use of the image recognition system according to one of the claims 1 to 34 for monitoring, security technology and also for checking and implementing access or use authorisation.

37. Use of the image recognition system according to one of the claims 1 to 34 as a camera in a chip card or credit card.

38. Use of the image recognition system according to one of the claims 1 to 34 in medical technology, e.g. in endoscopy.

39. Use of the image recognition system according to one of the claims 1 to 34 as sensor system in the automobile field, e.g. for monitoring tasks in the interior and exterior of vehicles.

40. Use of the image recognition system according to one of the claims 1 to 34 in the aircraft industry, e.g. for integrated and intelligent cockpit monitoring.

41. Use of the image recognition system according to one of the claims 1 to 34 for iris recognition, fingerprint recognition, object recognition and movement detection, in particular 3D movement tracking.